CLAIMS

What is claimed is:

1. An optical device, comprising:

an optical receiver adapted to process at least a portion of an incoming optical signal received by the optical device; and

an optical transmitter adapted to generate at least a portion of an outgoing optical signal transmitted by the optical device, wherein:

the optical transmitter comprises a light generator adapted to generate light for the portion of the outgoing optical signal generated by the optical transmitter; and

the optical receiver is optically coupled to the light generator to receive and use part of the light generated by the light generator to process the portion of the incoming optical signal.

2. The invention of claim 1, wherein the optical device is an optical add/drop multiplexer and the incoming and outgoing optical signals are WDM signals.

3. The invention of claim 1, wherein the optical device is an end node of an optical communications system and the incoming optical signal is a WDM signal.

4. The invention of claim 1, further comprising:

a splitter adapted to split the incoming optical signal, wherein the receiver receives part of the incoming optical signal from the splitter;

a wavelength blocker adapted to:

receive another part of the incoming optical signal from the splitter,

block at least one wavelength of light from the part of the incoming optical signal that is received by the wavelength blocker wherein the wavelength is at least one of the wavelengths in the light generated by the transmitter, and

pass the remainder of the incoming optical signal; and

a coupler adapted to combine the remainder of the incoming optical signal from the wavelength blocker with the portion of the outgoing optical signal generated by the transmitter.

5. The invention of claim 1, further comprising:

a demux filter adapted to wavelength split the incoming optical signal into N discrete single wavelength signals, wherein:

the receiver receives one of the N single wavelength signals;

an output mux filter receive the rest of the N single wavelength signals and combines them with the portion of the outgoing optical signal generated by the transmitter.

6. The invention of claim 1, wherein the light generator is a laser.

7. The invention of claim 1, wherein the receiver is a homodyne receiver .

8. The invention of claim 1, wherein the receiver is a heterodyne receiver .

9. The invention of claim 1, wherein the receiver is a phase-diversity homodyne receiver.

10. The invention of claim 1, wherein the receiver comprises an optical coupler having first and second input ports and a first output port, wherein:

the first input port is adapted to receive a first signal that includes the portion of the incoming optical signal received by the optical device; and

the second port is adapted to receive a second signal that includes the part of the light generated by the light generator; wherein:

the coupler optically couples the first and second signals and outputs the result of the coupling on the first output port.

11. The invention of claim 10, wherein the receiver further comprises circuitry adapted to convert and process the result of the coupling that is output from the first output port of the coupler to and in the electrical domain.

12. The invention of claim 1, wherein the receiver is balanced.

13. The invention of claim 1, wherein the light generator is adapted to be dynamically tuned to one wavelength of a plurality of different wavelengths.

14. A method for processing WDM optical signals in an optical device, comprising:

splitting an incoming WDM optical signal received by the optical device into first and second parts;

dropping a first optical signal from the first part of the incoming WDM optical signal;

blocking the first optical signal from the second part of the incoming WDM optical signal, and

adding a second optical signal to the remainder of the optical signals in the second part of the incoming WDM optical signal to generate an outgoing WDM optical signal transmitted by the optical device, wherein:

the first and second optical signals have substantially the same fundamental carrier wavelengths; and

a portion of the light used to add the second optical signal is used to drop the first optical signal.

15. The invention of claim 14, wherein the optical device is an optical add/drop multiplexer.

16. The invention of claim 14, wherein the second optical signal is a modulated laser signal.

17. The invention of claim 14, wherein the dropping is performed by a receiver that is a homodyne, heterodyne, or phase-diversity homodyne receiver.

18. The invention of claim 17, wherein the receiver comprises an optical coupler adapted to:

couple (a) the second part of the incoming WDM optical signal and (b) the portion of the light; and

generate an internal signal that includes a representation of data that was modulated onto a fundamental wavelength of the first optical signal in the incoming WDM optical signal.

19. The invention of claim 17, wherein the receiver further comprises circuitry adapted to convert and process the internal signal to and in the electrical domain.

20. The invention of claim 17, wherein the receiver is balanced.

21. The invention of claim 14, wherein the light generator is adapted to be dynamically tuned to one wavelength of a plurality of different wavelengths.

22. A method for processing WDM optical signals in an optical device, comprising:

wavelength demultiplexing an incoming WDM optical signal received by the optical device into N signals,

receiving one of the single wavelength signals of a first wavelength at a receiver;

sending the N-1 remaining single wavelength signals to an output multiplexer;

generating light of substantially the first wavelength;

feeding the light to a receiver, and to a transmitter that produces an added optical signal of substantially the first wavelength; and

combining, at the multiplexor, the added optical signal and the N-1 remaining single wavelength signals to form a new N signal WDM optical output.